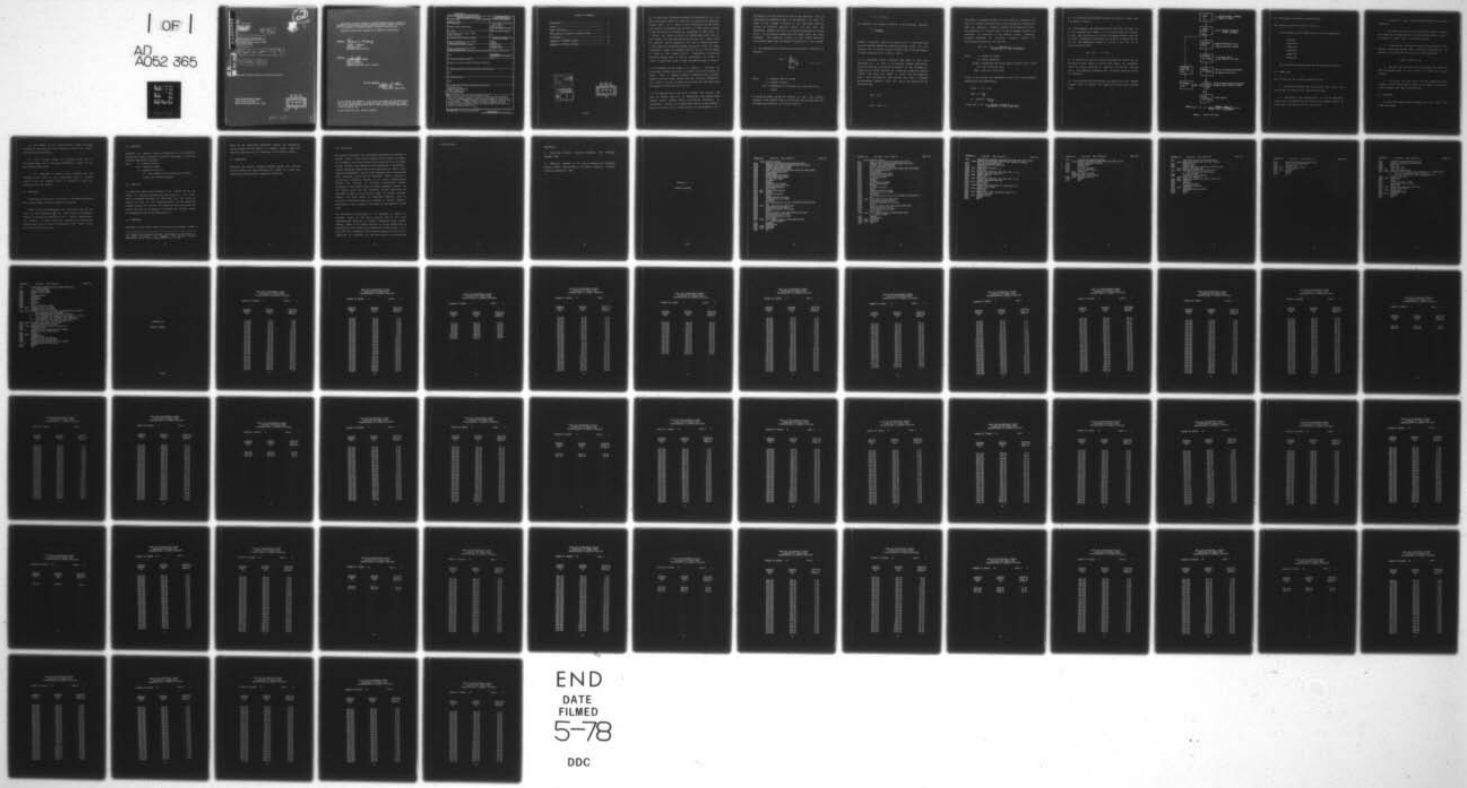
AD-A052 365 ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y F/G 17/2
OFFERED TRAFFIC CALCULATIONS.(U)
FEB 78 A FARRELL, D MCAULIFFE
UNCLASSIFIED RADC-TR-77-409 NL

| OF |
AD
A052 365



END
DATE
FILMED
5-78
DDC

RADC-TR-77-409
In-House Report
Feb [redacted] 78

12 73 P.

OFFERED TRAFFIC CALCULATIONS .

Arthur/Farrell/ Lt Colonel, USAFR
Daniel/McAuliffe

9 Rept. for Jan - Aug 77,

16 4519 17 19

Approved for public release; distribution unlimited.

ROME AIR DEVELOPMENT CENTER
Air Force Systems Command
Griffiss Air Force Base, New York 13441

209 050

This report has been reviewed by the RADC Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS it will be releasable to the general public, including foreign nations.

RADC-TR-77-409 has been reviewed and is approved for publication.

APPROVED: Richard A. Northrup

RICHARD A. NORTHRUP
Assistant Chief
Telecommunications Branch

APPROVED: Fred I. Diamond

FRED I. DIAMOND
Technical Director
Communications and Control Division

FOR THE COMMANDER: John P. Huss

JOHN P. HUSS
Acting Chief, Plans Office

If your address has changed or if you wish to be removed from the RADC mailing list, or if the addressee is no longer employed by your organization, please notify RADC (DCLF) Griffiss AFB NY 13441. This will assist us in maintaining a current mailing list.

Do not return this copy. Retain or destroy.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER RADC-TR-77-409	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) OFFERED TRAFFIC CALCULATIONS		5. TYPE OF REPORT & PERIOD COVERED In-House Report Jan 77 - Aug 77
		6. PERFORMING ORG. REPORT NUMBER N/A
7. AUTHOR(s) Arthur Farrell, Lt Colonel, USAFR Daniel McAuliffe		8. CONTRACT OR GRANT NUMBER(s) N/A
9. PERFORMING ORGANIZATION NAME AND ADDRESS Rome Air Development Center (DCLF) Griffiss AFB NY 13441		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62702F 45191907
11. CONTROLLING OFFICE NAME AND ADDRESS Rome Air Development Center (DCLF) Griffiss AFB NY 13441		12. REPORT DATE February 1978 13. NUMBER OF PAGES 71
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Same		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Same

18. SUPPLEMENTARY NOTES

None

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Telephone Traffic
Communications Switching
Traffic Engineering
Wire Communications

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

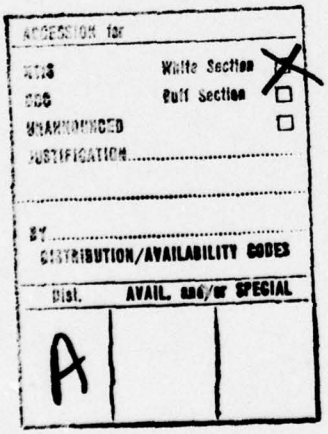
This report presents a numerical technique for deriving offered telephone traffic load knowing both the carried load and the number of trunks over which it was carried. A FORTRAN Program is presented in Appendix I which performs this calculation. A Family of Tables is included in Appendix II which provides a correlation between carried and offered load for cases where the number of trunks go from 2 to 20.

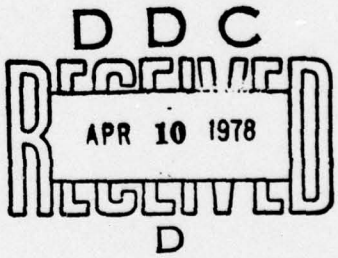
DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

TABLE OF CONTENTS





1.0 In many older telephone exchanges now operating at U.S. Air Force facilities, there are little or no provisions for measuring offered load. As a result, traffic engineering of PBX access lines such as to AUTOVON, must be done on a "best guess" estimate of what the load will probably be. Experience to date shows, as a result, the grade of service for AUTOVON PBX Access Lines is more likely to be 30% blocking during the busy hour rather than the desired, and DCA suggested, 10%. What is needed therefore, is some means of estimating offered load on the basis of known information, namely, the measured carried load (c) and the number of trunks or PBX access lines (n). Consequently, knowing the estimated offered load, (X) one can re-engineer the number of trunks or PBX Access Lines to meet the desired grade of service.

2.0 The purpose of this report is to present a technique for calculating offered load given the carried load and the number of trunks. Next, a FORTRAN program is presented used to produce tables of carried versus offered load and blocking probability; and finally, a series of tables are enclosed for the cases where the number of trunks go from 2 to 20.

3.0 The formulas used to calculate blocking and carried load from an offered load are so complicated even simple system designs require tedious manual calculations (Reference 1). Furthermore, because of the statistical nature of the problem, a number of formulas exist, differing only in the assumption of a

the behavior of calls failing to find an idle facility. Thus, in approaching the problem at hand, it was expedient to limit the scope of the problem initially to the case where calls not finding an available facility (trunk) will not wait and immediately abandon the call (i,e, they're considered to be lost calls). Is was further assumed that the trunk group was fully available. The remaining portion of this report deals with calculations based upon the Erlang B formula for a Loss System.

3.1 The expression for blocking using the Erlang B formula is as follows:

$$E(n) = \frac{\frac{X^n}{n!}}{\sum_{v=0}^{v=n} \frac{X^v}{v!}} \qquad (n = 1,2,\ldots)$$

where X = offered load in erlangs

n = number of trunks

E(n) = Probability of blocking (or a lost call) for n trunks

It should be noted, unlike the problem at hand, this formula assumes a known offered load (X) from which one can calculate the blocking and therefore, the carried load (c):

$$c = [1 - E(n)]X$$

Our interest is in finding a solution to the following equation:

$$X = \frac{c}{1 - E(n)}$$

However, since E(n) itself is a function of X, it was found that the only possible method for finding a solution (root) for this equation was to use an iterative method, such as Newton-Raphson to find a positive root X, given c, and n.

3.2 A literature search uncovered some work in this area (Reference 2). In 1967, L. M. Ericsson, Sweden, published an article containing an extensive discussion on the mathematical properties of Traffic Formulas and a numerical method for finding offered load given the number of trunks and the congestion [E(n)]. One conclusion of this article was that a standard Newton-Raphson approach would not lead to the solution of the following case.

$$f(X) = E(n)$$

$$f(X) - E(n) = 0$$

The method is generally useable for this class of equations but only if a suitable starting value can be determined (otherwise it does not converge). However, because of the behavior of f(X), the deduction of a starting value, it was concluded, would be as difficult to calculate as the formula itself. Therefore, Ericsson developed the following iterative formula for calculating the positive root for f(X):

$$Xp+1 = Xp - Xp\frac{En(Xp) - E}{En(Xp)\ [N + 1 - Xp + XpEn(Xp)]}$$

where n = number of trunks

E = given congestion

En(Xp) = congestion with Xp as offered traffic and n trunks

Xp = root currently tried

Xp+1 = new root to be tried

Since in our problem, the congestion is not known, the following modification was implemented:

since $c = (1 - E)X$

then $E = \frac{X-c}{X}$

or $En(Xp,c) = \frac{Xp - c}{Xp}$

so that $Xp+1 = Xp - Xp\frac{En(Xp) - En(Xp,c)}{En(Xp)[n + 1 - Xp + XpEn(Xp)]}$

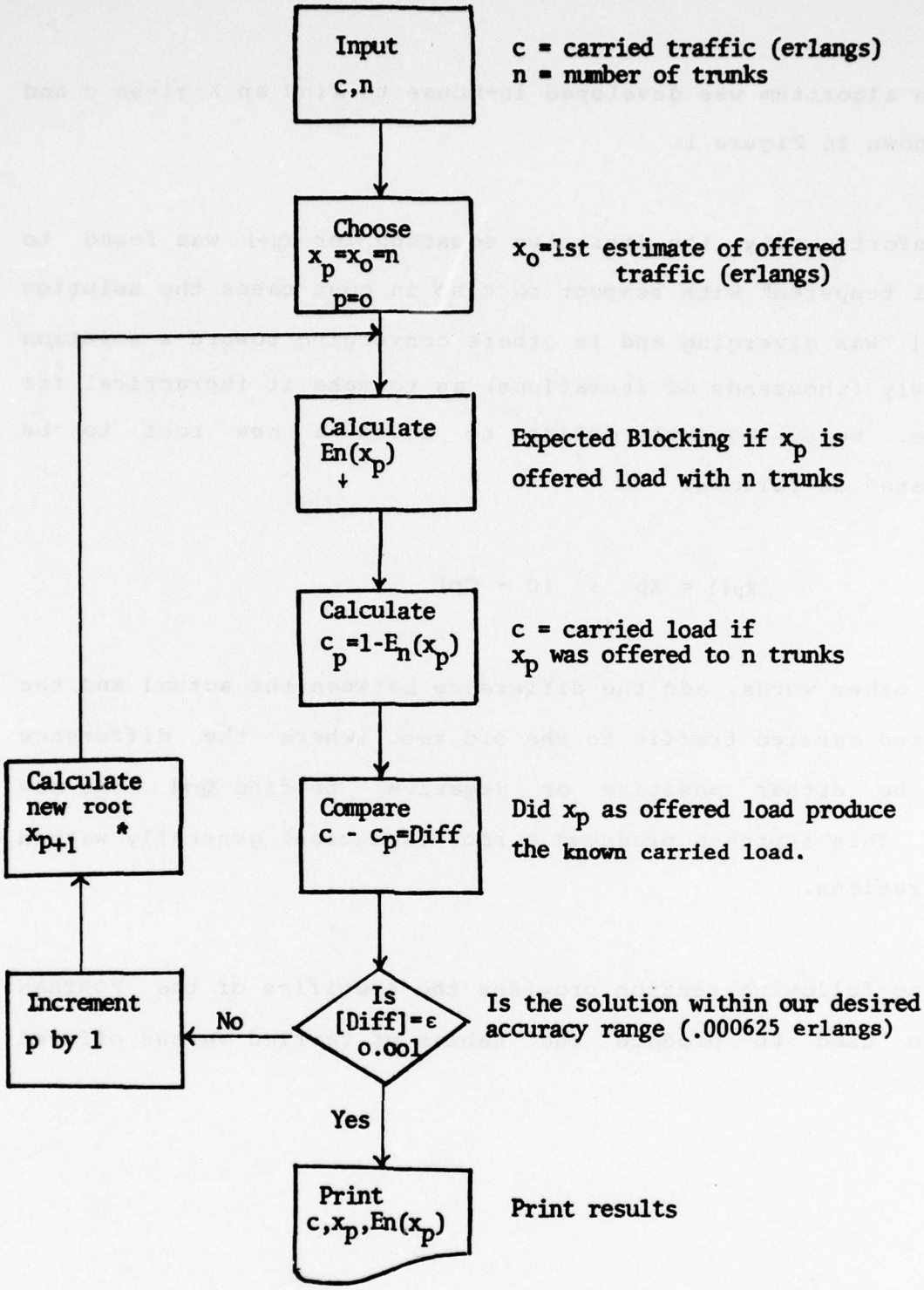
3.3 An algorithm was developed in-house to find an X given c and n as shown in Figure 1.

3.4 Unfortunately, the iterative equation for Xp+1 was found to be "ill tempered" with respect to c so in most cases the solution to Xp+1 was diverging and in others converging toward a solution so slowly (thousands of iterations) as to make it impractical for our use. We subsequently decided to allow a new root to be calculated as follows:

$$Xp+1 = Xp + (C - Cp)$$

or in other words, add the difference between the actual and the estimated carried traffic to the old root (where the difference could be either positive or negative) to find Xp+1 (the new root). This approach produced a root (solution) generally within 50 iterations.

3.5 The following section provides the specifics of the FORTRAN program used to produce the tables of carried versus offered load.



*Where $x_{p+1} = x_p - x_p \cdot \frac{En(x_p) - E_n(x_p,c)}{En(x_p) \cdot [n+1 - x_p + x_p En(x_p)]}$

Figure 1. Program Flow Chart

4.0 Description of Traffic Intensity Model.

The program consists of seven (7) modules:

A main program titled TRAFIC.FOR and six (6) subroutines:

INIT.FOR

NFACR.FOR

CSTBT.FOR

MORE.FOR

NEWRT.FOR

WROOT.FOR

The following paragraphs describe the individual modules:

4.1 TRAFIC.FOR:

This is the main line routine responsible for:

a. controlling program flow, calling for data input, and calculating the value of the required factorials.

b. determining the ranges/values of the DO Loops which control the calculation required vis-a-vis the number trunks or lines under consideration in the calculation.

c. calling of those modules which perform the following functions.

1. calculate the value of the term-by-term series required for computing the expected value of the offered traffic, given n, the number of trunks, and X, the offered traffic.

2. interactively provides the user with ability to, if he desires, change the maximum number iterations permitted by the program in its quest for the solution to the inequality:

$$c - Xp[1 - En(Xp)] \leq \varepsilon$$

3. display the results of the calculation thru WROOT.FOR over the desired range of the number of trunks and carried traffic.

4. initialize for each pass thru the program the first estimate of the offered traffic based on the number of trunks and carried traffic then under consideration.

4.2 INIT.FOR;

An interactive module which requests thru the console the input describing:

a. The ranges of the carried traffic, number of trunks (maximum 22) the step size to be considered within the traffic intensity data calculation.

b. The maximum number of iterations which can be over-ridden when, and if, the module MORE.FOR is called by the main program TRAFIC.FOR.

c. The magnitude of epsilon (ε) (required for the "goodness-of-fit" test of the calculations given X, offered traffic, E(n) the expected value of congestion) and C, the theoretical carried traffic.

4.3 NFAC.FOR:

Calculates the value of n! for n=0,2,...NOT.Where NOT equals the maximum number of trunks inputted in INIT.FOR;

NOTE: Due to the magnitude of the factorials and of the value of the expression $\frac{x^n}{n!}$ as n gets larger the program is limited to handling an expression up to n equals approximately 23. However, a second generation approach will resolve this problem using logs to reduce the magnitude of the stored values of the individual factorials.

4.4 CSTBT.FOR:

Generates the expected value of congestion, i.e. E(n) based on Erlangs loss formula (Erlang B) defined in paragraph 3.1 with the variables specified as follows:

where X = offered traffic

NOT = number of trunks

y = expected value of X

i.e. (the probability of congestion given NOT trunks and X offered traffic)

4.5 MORE.FOR:

An interactive module which displays on the console device the number of iterations attempted and the value of c - X[1 - E(n)] which is compared internally in TRAFIC.FOR with the value of epsilon to test for the "goodness-of-fit" of the calculated offered traffic (X) vis-a-vis the theoretical carried traffic and permits the user (if he desires) to increase the maximum number of iterations of the module NEWRT.FOR. (1)

4.6 NEWRT.FOR:

Generates the next "best guess" for the value of offered traffic

---

(1) Limited to the maximum integer representation permitted by the HOST processor; for example, the maximum integer representation on a PDP11 using FORTRAN IV is 32528.

based on the calculated difference between the theoretical carried traffic and the product of offered traffic times one minus the expected value of congestion of the offered traffic.

4.7 WROOT.FOR:

Generates the output including headings, paging, etc., and the solution details for each combination of number of trunks and theoretical carried traffic inputted in INIT.FOR.

5.0 Conclusion.

The routines developed, are successfully producing an estimate of offered traffic given carried traffic and the number of trunks. It is based on the Erlang B Loss formula assuming fully available trunks. However, what remains to be accomplished is significant. Similar additional models need to be constructed to match other trunking arrangements, such as those employing split trunk groups where overflow traffic must be considered. What is required is to develop a capability whereby an Air Force Communications Officer can evaluate an existing configuration against alternates. This could be done in terms of monthly tariffs for the leased trunks and the estimated offered load which the interface is meant to carry and the grade of service desired. Finally, the whole aspect of subscriber behavior, such as repetitive re-dialing needs to be included in further analysis; particularly with respect to its impact of the apparent offered load.

As a follow-on, to this effort it is proposed to conduct an in-house study of the entire process used by Air Force Communications Officers in traffic engineering base central offices. Where it is a manual process, it can be computerized as exemplified in this report and subsequently improved upon. It is felt that such a capability would greatly enhance the Air Force's capability in designing new base facilities of re-engineering

existing ones.

References.

1. "Switching Systems", American Telephone and Telegraph Company, 1961.

2. "Numerical Methods in the Use of Computers for Telephone Traffic Theory Applications", by Edward Szybicki, Ericsson Technics, November 4, 1967.

APPENDIX I

FORTRAN PROGRAM

```
      CCCCC PROGRAM TRAFFIC
0001          REAL C,XP,DIFF,ENXP,MINC,MAXC,SSC,CKDIF
0002          INTEGER MINN,MAXN,SSN,MAXTN,MAXTC,TOP,OLSTO
0003          INTEGER NOT,P,BHERE,PSTOP
0004          DOUBLE PRECISION FACT(25)
0005          CALL INIT(MINN,MAXN,SSN,MINC,MAXC,SSC,DIFF,PSTOP)
0006          CALL NFACR(MAXN,FACT)
0007          OLSTO=PSTOP
0008          MAXTN=(MAXN-MINN)/SSN+1
0009          MAXTC=(MAXC-MINC)/SSC+1
0010          DO 9999 J=1,MAXTN
0011          ICOUNT=0
0012          IPAGE=1
0013          NOT=MINN+((J-1)*SSN)
0014          IF(NOT.GT.10) GO TO 909
0016          BASE=.0625*NOT*NOT
0017          GO TO 907
0018    909   BASE=.03125*NOT*NOT
0019    907   BHERE=1
0020          DO 9998 I=1,MAXTC
0021          TOP=1
0022          C=BASE+(FLOAT(I-1)*SSC)
0023          IF(NOT.LE.C) GO TO 9999
0025          XP=2*NOT
0026          IF((FLOAT(NOT)-C).LT.0.0) XP=2*NOT/(FLOAT(NOT)-C)
0028          P=1
0029    1000  CALL CSTBT(XP,NOT,FACT,ENXP)
0030          CKDIF=ABS(C-XP*(1-ENXP))
0031          IF(CKDIF.LE.DIFF) GO TO 9000
0033          P=P+1
0034          IF(P.GT.PSTOP) CALL MORE(PSTOP,CKDIF,TOP)
0036          IF(TOP.EQ.2) GO TO 9000
0038          CALL NEWRT(ENXP,XP,C,NOT)
0039          GO TO 1000
0040    9000  CALL WROOT(XP,NOT,C,P,ENXP,BHERE,CKDIF
             1     ,ICOUNT,IPAGE)
0041          BHERE=2
0042          PSTOP=OLSTO
0043    9998  CONTINUE
0044    9999  CONTINUE
0045          END
```

```
      CCCCC PROGRAM TRAFFIC
0001          REAL C,XP,DIFF,ENXP,MINC,MAXC,SSC,CKDIF
0002          INTEGER MINN,MAXN,SSN,MAXTN,MAXTC,TOP,OLSTO
0003          INTEGER NOT,P,BHERE,PSTOP
0004          DOUBLE PRECISION FACT(25)
0005          CALL INIT(MINN,MAXN,SSN,MINC,MAXC,SSC,DIFF,PSTOP)
0006          CALL NFACR(MAXN,FACT)
0007          OLSTO=PSTOP
0008          MAXTN=(MAXN-MINN)/SSN+1
0009          MAXTC=(MAXC-MINC)/SSC+1
0010          DO 9999 J=1,MAXTN
0011          ICOUNT=0
0012          IPAGE=1
0013          NOT=MINN+((J-1)*SSN)
0014          BASE=.0625*NOT*NOT
0015          BHERE=1
0016          DO 9998 I=1,MAXTC
0017          TOP=1
0018          C=BASE+(FLOAT(I-1)*SSC)
0019          IF(NOT.LE.C) GO TO 9999
0021          XP=2*NOT
0022          IF((FLOAT(NOT)-C).LT.0.0) XP=2*NOT/(FLOAT(NOT)-C)
0024          P=1
0025    1000  CALL CSTBT(XP,NOT,FACT,ENXP)
0026          CKDIF=ABS(C-XP*(1-ENXP))
0027          IF(CKDIF.LE.DIFF) GO TO 9000
0029          P=P+1
0030          IF(P.GT.PSTOP) CALL MORE(PSTOP,CKDIF,TOP)
0032          IF(TOP.EQ.2) GO TO 9000
0034          CALL NEWRT(ENXP,XP,C,NOT)
0035          GO TO 1000
0036    9000  CALL WROOT(XP,NOT,C,P,ENXP,BHERE,CKDIF
             1     ,ICOUNT,IPAGE)
0037          BHERE=2
0038          PSTOP=OLSTO
0039    9998  CONTINUE
0040    9999  CONTINUE
0041          END
```

```
FORTRAN IV      V01C-03F   TUE 16-AUG-77                    PAGE 001

0001            SUBROUTINE INIT(MINN,MAXN,SSN,MINC,MAXC,SSC,DIFF,PSTOP)
      CCCCC     INPUTS; FOR MEASURED TRAFFIC AND NUMBER OF TRUNKS
0002            REAL DIFF,MINC,MAXC,SSC
0003            INTEGER MINN,MAXN,SSN,PSTOP
0004            TYPE 1000
0005    1000    FORMAT(10X,'INPUTS:'//)
0006            TYPE 1001
0007    1001    FORMAT(15X,'MIN,MAX, AND STEP SIZE C ?'$)
0008            ACCEPT 1002,MINC,MAXC,SSC
0009    1002    FORMAT(3F10.0)
0010            TYPE 1003
0011    1003    FORMAT(15X,'MIN,MAX, AND STEP SIZE N ?'$)
0012            ACCEPT 1004,MINN,MAXN,SSN
0013    1004    FORMAT(3I5)
0014            TYPE 10030
0015    10030   FORMAT(15X,'MAX NUMBER OF ITERATIONS ?'$)
0016            ACCEPT 10031,PSTOP
0017    10031   FORMAT(I5)
0018            TYPE 1005
0019    1005    FORMAT(15X,'TEST DIFFERENCE FACTOR ?'$)
0020            ACCEPT 1006,DIFF
0021    1006    FORMAT(F10.0)
0022            RETURN
0023            END
```

```
0001          SUBROUTINE NFACR(NFAC,FACT)
      CCCCC COMPUTE FACTORIALS WHERE NFAC.GT.1.AND..LE.25
0002          DOUBLE PRECISION FACT(25)
0003          INTEGER NFAC
0004          FACT(1)=1
0005          DO 1000 I=2,NFAC
0006          FACT(I)=FACT(I-1)*I
0007    1000  CONTINUE
      CCCCC DO 2000 I=1,NFAC
      CCCCC2000 TYPE 3000,FACT(I)
0008    3000  FORMAT(10X,D15.4)
0009          RETURN
0010          END
```

```
0001          SUBROUTINE CSTBT(XP,NOT,FACT,ENXP)
      CCCCC CALCULATE SERIES TERM BY TERM (CSTBT)
0002          REAL XP,ENXP
0003          INTEGER NOT
0004          DOUBLE PRECISION ITERM(25),FACT(25),SUMS
      CCCCC TYPE 100,XP,NOT,ENXP
0005  100     FORMAT(1X,'CSTBT 100,XP,NOT,ENXP',
             1    10X,F10.4,10X,I5,10X,F10.4)
0006          DO 1000 I=1,NOT
0007          ITERM(I)=(XP**I)/FACT(I)
      CCCCC TYPE 200, ITERM(I)
0008  200     FORMAT(1X,'CSTBT 200 ITERM',20X,F15.0)
0009  1000    CONTINUE
0010          SUMS=0.0
0011          DO 2000 II=1,NOT
0012          SUMS=SUMS+ITERM(II)
0013  2000    CONTINUE
0014          ENXP=ITERM(NOT)/(1+SUMS)
0015          RETURN
0016          END
```

```
FORTRAN IV      V01C-03F   TUE 16-AUG-77                    PAGE 001

0001            SUBROUTINE NEWRT(ENXP,XP,C,NOT)
0002            REAL C,XP,NXP,TDIF,ENXP
0003            INTEGER NOT
0004   150      TDIF=(C-XP*(1-ENXP))
0005   99       NXP=XP+TDIF
0006   201      XP=NXP
0007            RETURN
0008            END
```

```
FORTRAN IV      V01C-03F   TUE 16-AUG-77                    PAGE 001

0001            SUBROUTINE MORE(PSTOP,DIFF,TOP)
0002            INTEGER PSTOP,IYES,INO,MORE,TOP
0003            REAL DIFF
0004            DATA IYES /'Y'/
0005            DATA INO /'N'/
0006   999      TYPE 1000,PSTOP,DIFF
0007   1000     FORMAT(1X,'THE PROGRAM HAS COMPLETED',I5,'ITERATIONS',/
               1     10X,'THE CALCULATED DIFF IS',F10.4,/
               1     10X,'DO YOU REQUIRE MORE ITERATIONS ?'$)
0008            ACCEPT 2000,IANS
0009   2000     FORMAT(A1)
0010            TOP=1
0011            IF(IANS.EQ.INO)  TOP=2
0013            IF(TOP.EQ.2) GO TO 5000
0015            TYPE 3000
0016   3000     FORMAT(10X,'HOW MANY MORE ?'$)
0017            ACCEPT 4000,MORE
0018   4000     FORMAT(I5)
0019            PSTOP=PSTOP+MORE
0020   5000     CONTINUE
0021            RETURN
0022            END
```

```
0001          SUBROUTINE WROOT(XP,NOT,C,P,ENXP,BHERE,DIFF
             1     ,ICOUNT,IPAGE)
0002          REAL XP,C,ENXP,DIFF
0003          INTEGER NOT,P,BHERE
0004          IY=9
0005          PENXP=ENXP*100
0006          PC=C*36.
0007          PXP=XP*36.
0008          IX=10
0009          NLINE=30
0010          P=P-1
0011          GO TO (500,2000) BHERE
0012    500   WRITE(IX,1000) NOT,IPAGE
        C     WRITE(IY,1000) NOT,IPAGE
0013    1000  FORMAT('1'///////,T30,'ROME AIR DEVELOPMENT CENTER'/
             1     T33,'GRIFFISS AIR FORCE BASE'/
             1     T29,'COMMUNICATION & CONTROL DIVISION'/
             1     //,T17,'NUMBER OF TRUNKS',I5,T56,'PAGE # ',I5/////
             1     T18,'CARRIED',T39,'OFFERED',T60,'EXPECTED'/
             2     T18,'TRAFFIC',T39,'TRAFFIC',T60,'VALUE XP'/
             3     T20,'CCS',T41,'CCS',T60,'PERCENT'///)
0014    2000  IF(ICOUNT.EQ.NLINE) GO TO 4000
0016          WRITE(IX,3000)PC,PXP,PENXP
0017    3000  FORMAT(14X,F10.3,11X,F10.2,14X,F7.2)
0018          ICOUNT=ICOUNT+1
0019          IF(ENXP.LE..05.OR.ENXP.GT..35) RETURN
        C     WRITE(IY,3000) PC,PXP,PENXP
0021          RETURN
0022    4000  ICOUNT=0
0023          IPAGE=IPAGE+1
0024          WRITE(IX,1000) NOT,IPAGE
0025          WRITE(IX,3000) PC,PXP,PENXP
0026          IF(ENXP.LE..05.OR.ENXP.GT..35) RETURN
        C     WRITE(IY,3000) PC,PXP,PENXP
0028          RETURN
0029          END
```

APPENDIX II

TRAFFIC TABLES

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 2 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
9.000	9.24	2.55
11.250	11.71	3.84
13.500	14.26	5.32
15.750	16.95	7.01
18.000	19.76	8.86
20.250	22.75	10.90
22.500	25.91	13.09
24.750	29.28	15.43
27.000	32.91	17.92
29.250	36.84	20.56
31.500	41.12	23.34
33.750	45.78	26.25
36.000	50.96	29.32
38.250	56.70	32.51
40.500	63.16	35.84
42.750	70.49	39.32
45.000	78.89	42.93
47.250	88.68	46.70
49.500	100.26	50.61
51.750	114.22	54.67
54.000	131.42	58.90
56.250	152.82	63.21
58.500	181.46	67.77
60.750	221.11	72.54
63.000	279.94	77.50
65.250	376.96	82.70
67.500	569.11	88.14
69.750	1138.48	93.88

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 3 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
20.250	20.63	1.77
22.500	23.04	2.31
24.750	25.51	2.94
27.000	28.04	3.64
29.250	30.61	4.43
31.500	33.27	5.30
33.750	36.01	6.25
36.000	38.84	7.29
38.250	41.79	8.42
40.500	44.83	9.63
42.750	48.00	10.92
45.000	51.33	12.31
47.250	54.81	13.78
49.500	58.48	15.34
51.750	62.37	16.99
54.000	66.47	18.73
56.250	70.84	20.57
58.500	75.51	22.50
60.750	80.52	24.53
63.000	85.91	26.65
65.250	91.78	28.88
67.500	98.16	31.22
69.750	105.19	33.67
72.000	112.94	36.23
74.250	121.55	38.90
76.500	131.27	41.70
78.750	142.27	44.63
81.000	154.92	47.70
83.250	169.61	50.91
85.500	187.01	54.27

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 3 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
87.750	207.97	57.80
90.000	233.27	61.43
92.250	265.92	65.32
94.500	308.89	69.41
96.750	368.34	73.74
99.000	456.56	78.32
101.250	602.04	83.19
103.500	890.13	88.38
105.750	1743.97	93.94

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 4 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
36.000	36.59	1.62
38.250	39.02	1.95
40.500	41.48	2.33
42.750	43.98	2.76
45.000	46.50	3.22
47.250	49.09	3.73
49.500	51.73	4.29
51.750	54.43	4.90
54.000	57.18	5.54
56.250	60.01	6.25
58.500	62.91	7.00
60.750	65.90	7.80
63.000	69.00	8.66
65.250	72.17	9.57
67.500	75.48	10.54
69.750	78.88	11.56
72.000	82.45	12.65
74.250	86.14	13.79
76.500	90.01	14.99
78.750	94.07	16.27
81.000	98.32	17.60
83.250	102.79	18.99
85.500	107.51	20.46
87.750	112.52	22.00
90.000	117.84	23.61
92.250	123.52	25.30
94.500	129.61	27.07
96.750	136.13	28.92
99.000	143.21	30.86
101.250	150.88	32.88

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 4 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
103.500	159.26	35.00
105.750	168.48	37.22
108.000	178.66	39.54
110.250	190.02	41.97
112.500	202.81	44.52
114.750	217.35	47.20
117.000	234.05	50.00
119.250	253.51	52.95
121.500	276.53	56.06
123.750	303.72	59.26
126.000	337.82	62.71
128.250	381.14	66.36
130.500	438.21	70.22
132.750	517.23	74.34
135.000	634.52	78.73
137.250	828.17	83.43
139.500	1211.90	88.49
141.750	2349.88	93.97

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 5 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
56.250	57.25	1.74
58.500	59.71	2.01
60.750	62.19	2.30
63.000	64.72	2.62
65.250	67.25	2.96
67.500	69.84	3.34
69.750	72.48	3.74
72.000	75.16	4.18
74.250	77.87	4.65
76.500	80.66	5.15
78.750	83.51	5.68
81.000	86.40	6.24
83.250	89.38	6.84
85.500	92.44	7.48
87.750	95.55	8.16
90.000	98.78	8.87
92.250	102.08	9.62
94.500	105.50	10.42
96.750	109.02	11.25
99.000	112.68	12.13
101.250	116.46	13.05
103.500	120.39	14.02
105.750	124.47	15.03
108.000	128.75	16.10
110.250	133.19	17.21
112.500	137.84	18.37
114.750	142.72	19.59
117.000	147.87	20.86
119.250	153.29	22.20
121.500	159.03	23.59

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 5 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
123.750	165.13	25.05
126.000	171.62	26.57
128.250	178.53	28.16
130.500	185.98	29.82
132.750	193.98	31.55
135.000	202.64	33.37
137.250	212.07	35.27
139.500	222.38	37.26
141.750	233.71	39.34
144.000	246.27	41.52
146.250	260.30	43.81
148.500	276.10	46.21
150.750	294.05	48.73
153.000	314.73	51.38
155.250	338.84	54.18
157.500	366.79	57.07
159.750	401.10	60.18
162.000	443.51	63.48
164.250	497.37	66.98
166.500	568.40	70.71
168.750	666.84	74.70
171.000	813.11	78.97
173.250	1054.75	83.58
175.500	1533.96	88.56
177.750	2955.93	93.99

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 6 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
81.000	82.73	2.07
83.250	85.23	2.32
85.500	87.77	2.58
87.750	90.34	2.86
90.000	92.95	3.16
92.250	95.60	3.49
94.500	98.27	3.83
96.750	101.00	4.20
99.000	103.78	4.59
101.250	106.60	5.00
103.500	109.46	5.44
105.750	112.40	5.90
108.000	115.40	6.40
110.250	118.44	6.91
112.500	121.57	7.45
114.750	124.78	8.03
117.000	128.06	8.63
119.250	131.43	9.26
121.500	134.91	9.92
123.750	138.46	10.62
126.000	142.15	11.35
128.250	145.93	12.10
130.500	149.86	12.90
132.750	153.90	13.74
135.000	158.10	14.60
137.250	162.48	15.52
139.500	167.02	16.47
141.750	171.74	17.46
144.000	176.70	18.50
146.250	181.87	19.58

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 6 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
148.500	187.29	20.70
150.750	192.99	21.88
153.000	199.00	23.11
155.250	205.35	24.39
157.500	212.05	25.72
159.750	219.20	27.11
162.000	226.81	28.57
164.250	234.97	30.09
166.500	243.71	31.67
168.750	253.15	33.33
171.000	263.37	35.07
173.250	274.49	36.88
175.500	286.69	38.78
177.750	300.11	40.76
180.000	314.99	42.85
182.250	331.61	45.03
184.500	350.37	47.34
186.750	371.72	49.75
189.000	396.29	52.30
191.250	424.98	54.99
193.500	458.28	57.78
195.750	499.22	60.79
198.000	549.80	63.99
200.250	614.14	67.40
202.500	699.08	71.04
204.750	816.85	74.94
207.000	992.01	79.14
209.250	1281.57	83.67
211.500	1856.17	88.61
213.750	3562.06	94.00

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 7 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
110.250	113.25	2.64
112.500	115.86	2.89
114.750	118.51	3.15
117.000	121.16	3.43
119.250	123.87	3.72
121.500	126.62	4.03
123.750	129.41	4.36
126.000	132.23	4.71
128.250	135.11	5.07
130.500	138.04	5.46
132.750	141.04	5.86
135.000	144.06	6.28
137.250	147.17	6.73
139.500	150.34	7.20
141.750	153.56	7.69
144.000	156.88	8.20
146.250	160.28	8.74
148.500	163.74	9.30
150.750	167.31	9.89
153.000	170.96	10.50
155.250	174.73	11.14
157.500	178.60	11.81
159.750	182.60	12.51
162.000	186.72	13.23
164.250	190.99	13.99
166.500	195.40	14.78
168.750	199.98	15.61
171.000	204.72	16.46
173.250	209.65	17.36
175.500	214.79	18.29

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 7 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
177.750	220.18	19.26
180.000	225.78	20.27
182.250	231.66	21.32
184.500	237.83	22.42
186.750	244.33	23.56
189.000	251.16	24.74
191.250	258.41	25.98
193.500	266.10	27.27
195.750	274.26	28.62
198.000	282.97	30.02
200.250	292.33	31.49
202.500	302.37	33.02
204.750	313.19	34.62
207.000	324.95	36.29
209.250	337.74	38.04
211.500	351.77	39.87
213.750	367.25	41.79
216.000	384.40	43.80
218.250	403.62	45.92
220.500	425.27	48.15
222.750	449.97	50.49
225.000	478.41	52.96
227.250	510.96	55.53
229.500	550.26	58.30
231.750	597.76	61.23
234.000	656.49	64.36
236.250	731.26	67.70
238.500	830.04	71.27
240.750	967.12	75.11
243.000	1171.10	79.25
245.250	1508.54	83.74

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 7 PAGE # 3

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
247.500	2178.52	88.64
249.750	4168.09	94.01

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 8 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
144.000	149.26	3.52
146.250	152.02	3.78
148.500	154.81	4.06
150.750	157.62	4.35
153.000	160.49	4.66
155.250	163.41	4.98
157.500	166.38	5.32
159.750	169.37	5.68
162.000	172.44	6.05
164.250	175.57	6.44
166.500	178.73	6.84
168.750	181.98	7.26
171.000	185.30	7.71
173.250	188.67	8.17
175.500	192.14	8.65
177.750	195.68	9.16
180.000	199.30	9.68
182.250	203.03	10.23
184.500	206.85	10.80
186.750	210.76	11.39
189.000	214.81	12.00
191.250	218.95	12.64
193.500	223.24	13.31
195.750	227.65	14.00
198.000	232.21	14.73
200.250	236.94	15.48
202.500	241.83	16.26
204.750	246.91	17.07
207.000	252.20	17.91
209.250	257.69	18.79

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 8 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
211.500	263.42	19.70
213.750	269.40	20.65
216.000	275.67	21.64
218.250	282.24	22.66
220.500	289.14	23.73
222.750	296.40	24.84
225.000	304.08	26.00
227.250	312.21	27.21
229.500	320.83	28.46
231.750	330.00	29.77
234.000	339.81	31.13
236.250	350.32	32.56
238.500	361.63	34.04
240.750	373.86	35.60
243.000	387.11	37.22
245.250	401.56	38.92
247.500	417.42	40.70
249.750	434.90	42.57
252.000	454.33	44.53
254.250	476.09	46.59
256.500	500.63	48.76
258.750	528.63	51.05
261.000	560.92	53.47
263.250	597.88	55.97
265.500	642.55	58.68
267.750	696.57	61.57
270.000	763.45	64.64
272.250	848.61	67.92
274.500	961.19	71.44
276.750	1117.54	75.24
279.000	1350.33	79.34

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 8 PAGE # 3

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
281.250	1735.59	83.80
283.500	2500.91	88.67
285.750	4774.21	94.02

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 9 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
182.250	191.49	4.82
184.500	194.45	5.11
186.750	197.48	5.43
189.000	200.55	5.75
191.250	203.68	6.09
193.500	206.84	6.45
195.750	210.08	6.82
198.000	213.39	7.20
200.250	216.74	7.60
202.500	220.17	8.02
204.750	223.69	8.46
207.000	227.25	8.91
209.250	230.92	9.38
211.500	234.68	9.87
213.750	238.51	10.38
216.000	242.46	10.91
218.250	246.49	11.45
220.500	250.66	12.02
222.750	254.92	12.62
225.000	259.33	13.23
227.250	263.86	13.87
229.500	268.55	14.53
231.750	273.38	15.22
234.000	278.37	15.93
236.250	283.56	16.68
238.500	288.93	17.45
240.750	294.50	18.25
243.000	300.30	19.08
245.250	306.34	19.94
247.500	312.65	20.83

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 9 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
249.750	319.24	21.76
252.000	326.15	22.73
254.250	333.40	23.74
256.500	341.03	24.78
258.750	349.05	25.87
261.000	357.55	27.00
263.250	366.54	28.17
265.500	376.11	29.40
267.750	386.28	30.68
270.000	397.16	32.01
272.250	408.81	33.40
274.500	421.38	34.85
276.750	434.95	36.37
279.000	449.70	37.95
281.250	465.80	39.61
283.500	483.44	41.35
285.750	502.94	43.18
288.000	524.60	45.10
290.250	548.89	47.12
292.500	576.32	49.24
294.750	607.60	51.49
297.000	643.73	53.86
299.250	685.06	56.32
301.500	735.09	58.99
303.750	795.63	61.83
306.000	870.58	64.85
308.250	966.13	68.10
310.500	1092.51	71.58
312.750	1268.07	75.34
315.000	1529.62	79.41
317.250	1962.74	83.84

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 9 PAGE # 3

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
319.500	2823.30	88.68
321.750	5380.38	94.02

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 10 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
225.000	241.21	6.71
227.250	244.52	7.06
229.500	247.93	7.43
231.750	251.39	7.81
234.000	254.91	8.20
236.250	258.52	8.61
238.500	262.21	9.03
240.750	265.96	9.47
243.000	269.81	9.93
245.250	273.76	10.41
247.500	277.79	10.90
249.750	281.94	11.41
252.000	286.18	11.94
254.250	290.55	12.49
256.500	295.03	13.06
258.750	299.66	13.65
261.000	304.42	14.26
263.250	309.32	14.89
265.500	314.40	15.55
267.750	319.64	16.23
270.000	325.06	16.93
272.250	330.71	17.67
274.500	336.54	18.43
276.750	342.60	19.22
279.000	348.92	20.03
281.250	355.50	20.88
283.500	362.38	21.76
285.750	369.58	22.68
288.000	377.13	23.63
290.250	385.03	24.61

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 10 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
292.500	393.37	25.64
294.750	402.15	26.70
297.000	411.45	27.81
299.250	421.30	28.96
301.500	431.77	30.17
303.750	442.93	31.42
306.000	454.87	32.72
308.250	467.67	34.08
310.500	481.47	35.51
312.750	496.42	36.99
315.000	512.62	38.55
317.250	530.34	40.18
319.500	549.79	41.88
321.750	571.27	43.67
324.000	595.17	45.56
326.250	621.95	47.54
328.500	652.21	49.63
330.750	686.80	51.84
333.000	725.87	54.13
335.250	772.45	56.60
337.500	827.79	59.23
339.750	894.82	62.03
342.000	977.86	65.03
344.250	1083.77	68.24
346.500	1223.88	71.69
348.750	1418.68	75.42
351.000	1709.00	79.46
353.250	2189.90	83.87
355.500	3145.74	88.70
357.750	5986.51	94.02

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 11 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
136.125	136.32	0.13
140.625	140.89	0.17
145.125	145.49	0.21
149.625	150.11	0.26
154.125	154.77	0.32
158.625	159.24	0.38
163.125	163.89	0.46
167.625	168.58	0.55
172.125	173.30	0.66
176.625	178.08	0.78
181.125	182.91	0.91
185.625	187.81	1.07
190.125	192.52	1.23
194.625	197.47	1.42
199.125	202.50	1.63
203.625	207.62	1.87
208.125	212.84	2.13
212.625	217.91	2.40
217.125	223.26	2.72
221.625	228.74	3.06
226.125	234.37	3.44
230.625	239.88	3.83
235.125	245.73	4.27
239.625	251.77	4.75
244.125	257.75	5.25
248.625	264.12	5.82
253.125	270.74	6.42
257.625	277.31	7.05
262.125	284.39	7.76
266.625	291.51	8.49

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 11 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
271.125	299.18	9.31
275.625	306.95	10.16
280.125	315.13	11.07
284.625	323.94	12.08
289.125	333.02	13.13
293.625	342.65	14.26
298.125	352.90	15.48
302.625	363.86	16.78
307.125	375.63	18.19
311.625	388.35	19.70
316.125	401.92	21.31
320.625	417.01	23.06
325.125	433.37	24.93
329.625	451.55	26.96
334.125	471.71	29.13
338.625	494.76	31.52
343.125	520.94	34.09
347.625	551.14	36.89
352.125	586.80	39.96
356.625	629.91	43.35
361.125	682.66	47.07
365.625	749.97	51.22
370.125	828.96	55.38
374.625	949.18	60.55
379.125	1129.31	66.45
383.625	1434.15	73.27
388.125	2069.93	81.26
392.625	4277.55	90.83

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 12 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
162.000	162.31	0.16
166.500	166.91	0.20
171.000	171.54	0.24
175.500	176.21	0.30
180.000	180.65	0.35
184.500	185.29	0.42
189.000	189.97	0.50
193.500	194.69	0.59
198.000	199.44	0.69
202.500	204.25	0.80
207.000	209.12	0.93
211.500	213.80	1.07
216.000	218.71	1.23
220.500	223.69	1.40
225.000	228.74	1.59
229.500	233.88	1.81
234.000	239.12	2.05
238.500	244.14	2.29
243.000	249.50	2.57
247.500	254.97	2.88
252.000	260.58	3.21
256.500	266.03	3.56
261.000	271.84	3.95
265.500	277.82	4.37
270.000	283.72	4.81
274.500	289.98	5.30
279.000	296.47	5.83
283.500	302.92	6.38
288.000	309.81	6.99
292.500	316.74	7.62

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 12 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
297.000	324.14	8.32
301.500	331.63	9.05
306.000	339.67	9.86
310.500	347.85	10.70
315.000	356.46	11.60
319.500	365.73	12.59
324.000	375.28	13.62
328.500	385.43	14.73
333.000	396.23	15.91
337.500	407.77	17.19
342.000	420.17	18.56
346.500	433.33	20.00
351.000	447.84	21.58
355.500	463.48	23.26
360.000	480.69	25.07
364.500	499.77	27.03
369.000	521.12	29.15
373.500	545.03	31.43
378.000	572.37	33.92
382.500	603.81	36.62
387.000	640.83	39.58
391.500	685.14	42.83
396.000	739.39	46.41
400.500	808.04	50.41
405.000	887.65	54.40
409.500	1007.28	59.37
414.000	1182.93	65.02
418.500	1469.67	71.54
423.000	2029.86	79.17
427.500	3643.11	88.27

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 13 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
190.125	190.63	0.21
194.625	195.28	0.25
199.125	199.72	0.30
203.625	204.35	0.35
208.125	209.01	0.41
212.625	213.69	0.48
217.125	218.41	0.56
221.625	223.17	0.65
226.125	227.97	0.76
230.625	232.84	0.87
235.125	237.50	0.99
239.625	242.40	1.13
244.125	247.35	1.28
248.625	252.38	1.45
253.125	257.48	1.64
257.625	262.68	1.84
262.125	267.66	2.05
266.625	272.96	2.29
271.125	278.35	2.55
275.625	283.87	2.84
280.125	289.25	3.14
284.625	294.94	3.47
289.125	300.77	3.83
293.625	306.77	4.22
298.125	312.64	4.62
302.625	318.90	5.06
307.125	325.38	5.54
311.625	331.77	6.04
316.125	338.61	6.59
320.625	345.47	7.16

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 13 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
325.125	352.78	7.79
329.625	360.16	8.45
334.125	368.04	9.17
338.625	376.05	9.92
343.125	384.65	10.74
347.625	393.41	11.60
352.125	402.65	12.51
356.625	412.40	13.49
361.125	422.95	14.56
365.625	433.91	15.69
370.125	445.37	16.86
374.625	457.89	18.15
379.125	471.36	19.53
383.625	485.95	21.01
388.125	501.57	22.58
392.625	518.71	24.27
397.125	537.62	26.10
401.625	558.66	28.07
406.125	582.03	30.19
410.625	608.57	32.49
415.125	638.81	34.98
419.625	674.01	37.71
424.125	715.63	40.71
428.625	765.70	43.99
433.125	827.43	47.63
437.625	906.32	51.69
442.125	998.88	55.76
446.625	1140.03	60.84
451.125	1352.23	66.65
455.625	1711.21	73.39
460.125	2461.57	81.32

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 13 PAGE # 3

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
464.625	5069.50	90.84

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 14 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
220.500	221.10	0.27
225.000	225.72	0.32
229.500	230.37	0.37
234.000	235.04	0.43
238.500	239.74	0.50
243.000	244.48	0.57
247.500	249.26	0.66
252.000	254.09	0.76
256.500	258.74	0.86
261.000	263.59	0.97
265.500	268.50	1.10
270.000	273.46	1.24
274.500	278.50	1.40
279.000	283.60	1.57
283.500	288.56	1.74
288.000	293.75	1.94
292.500	299.03	2.16
297.000	304.41	2.39
301.500	309.89	2.65
306.000	315.24	2.91
310.500	320.88	3.21
315.000	326.65	3.53
319.500	332.57	3.87
324.000	338.37	4.22
328.500	344.53	4.62
333.000	350.88	5.04
337.500	357.16	5.48
342.000	363.83	5.96
346.500	370.74	6.48
351.000	377.60	7.01

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 14 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
355.500	384.96	7.60
360.000	392.34	8.21
364.500	400.25	8.88
369.000	408.23	9.57
373.500	416.59	10.32
378.000	425.53	11.13
382.500	434.68	11.97
387.000	444.32	12.87
391.500	454.49	13.83
396.000	465.48	14.88
400.500	476.91	15.98
405.000	488.88	17.13
409.500	501.93	18.38
414.000	515.97	19.73
418.500	530.94	21.15
423.000	547.45	22.69
427.500	565.28	24.34
432.000	584.94	26.11
436.500	606.55	28.00
441.000	630.79	30.06
445.500	658.24	32.29
450.000	689.67	34.72
454.500	725.90	37.36
459.000	768.36	40.23
463.500	819.48	43.41
468.000	882.01	46.92
472.500	961.23	50.82
477.000	1053.65	54.75
481.500	1192.21	59.63
486.000	1396.38	65.21
490.500	1730.13	71.66

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 14 PAGE # 3

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
495.000	2382.38	79.23
499.500	4263.57	88.29

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 15 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
253.125	254.05	0.35
257.625	258.72	0.41
262.125	263.42	0.47
266.625	268.15	0.54
271.125	272.93	0.62
275.625	277.75	0.70
280.125	282.37	0.79
284.625	287.22	0.89
289.125	292.10	1.01
293.625	297.04	1.13
298.125	302.04	1.26
302.625	307.11	1.41
307.125	312.26	1.57
311.625	317.18	1.74
316.125	322.40	1.93
320.625	327.71	2.13
325.125	333.11	2.35
329.625	338.40	2.58
334.125	343.94	2.83
338.625	349.59	3.11
343.125	355.37	3.40
347.625	361.07	3.71
352.125	367.05	4.04
356.625	373.20	4.41
361.125	379.52	4.79
365.625	385.74	5.19
370.125	392.36	5.63
374.625	399.21	6.10
379.125	405.98	6.59
383.625	413.23	7.12

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 15 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
388.125	420.49	7.67
392.625	428.24	8.27
397.125	436.06	8.90
401.625	444.42	9.58
406.125	452.89	10.29
410.625	461.76	11.05
415.125	471.27	11.87
419.625	481.02	12.73
424.125	491.31	13.64
428.625	502.18	14.61
433.125	513.70	15.65
437.625	525.96	16.76
442.125	539.06	17.95
446.625	553.13	19.21
451.125	568.05	20.55
455.625	584.24	21.99
460.125	602.12	23.55
464.625	621.49	25.20
469.125	642.67	26.97
473.625	666.53	28.91
478.125	692.87	30.97
482.625	723.05	33.22
487.125	757.51	35.67
491.625	797.68	38.34
496.125	844.97	41.26
500.625	902.15	44.48
505.125	972.75	48.05
509.625	1062.98	52.04
514.125	1169.25	56.05
518.625	1331.18	61.06
523.125	1575.15	66.80

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 15 PAGE # 3

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
527.625	1988.65	73.48
532.125	2853.53	81.36
536.625	5861.70	90.85

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 16 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
288.000	289.44	0.47
292.500	294.18	0.54
297.000	298.97	0.61
301.500	303.82	0.69
306.000	308.40	0.77
310.500	313.24	0.87
315.000	318.13	0.97
319.500	323.08	1.08
324.000	328.07	1.21
328.500	333.14	1.34
333.000	338.04	1.48
337.500	343.17	1.64
342.000	348.37	1.81
346.500	353.65	1.99
351.000	359.03	2.19
355.500	364.50	2.41
360.000	369.77	2.63
364.500	375.37	2.87
369.000	381.09	3.14
373.500	386.94	3.42
378.000	392.63	3.71
382.500	398.68	4.03
387.000	404.88	4.37
391.500	411.00	4.73
396.000	417.47	5.12
400.500	424.14	5.53
405.000	430.76	5.96
409.500	437.79	6.43
414.000	445.07	6.93
418.500	452.30	7.44

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 16 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
423.000	460.05	8.01
427.500	467.83	8.59
432.000	476.16	9.23
436.500	484.57	9.89
441.000	493.36	10.59
445.500	502.77	11.35
450.000	512.38	12.14
454.500	522.50	12.98
459.000	533.15	13.88
463.500	544.42	14.84
468.000	556.35	15.85
472.500	569.05	16.94
477.000	582.62	18.10
481.500	597.17	19.33
486.000	612.61	20.64
490.500	629.35	22.03
495.000	647.59	23.54
499.500	667.59	25.15
504.000	689.66	26.89
508.500	713.98	28.75
513.000	741.29	30.77
517.500	772.25	32.96
522.000	807.51	35.33
526.500	848.25	37.91
531.000	896.32	40.73
535.500	954.20	43.86
540.000	1025.15	47.30
544.500	1114.94	51.14
549.000	1219.83	55.01
553.500	1377.64	59.84
558.000	1610.01	65.36

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 16 PAGE # 3

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
562.500	1990.51	71.75
567.000	2735.21	79.28
571.500	4884.07	88.30

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 17 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
325.125	327.20	0.63
329.625	331.99	0.71
334.125	336.82	0.79
338.625	341.68	0.88
343.125	346.60	0.98
347.625	351.56	1.09
352.125	356.59	1.21
356.625	361.69	1.34
361.125	366.55	1.47
365.625	371.70	1.62
370.125	376.92	1.78
374.625	382.21	1.95
379.125	387.60	2.14
383.625	392.83	2.33
388.125	398.33	2.54
392.625	403.93	2.77
397.125	409.64	3.02
401.625	415.25	3.27
406.125	421.14	3.55
410.625	427.16	3.84
415.125	433.33	4.16
419.625	439.40	4.48
424.125	445.82	4.84
428.625	452.42	5.22
433.125	458.98	5.61
437.625	465.91	6.04
442.125	473.07	6.50
446.625	480.19	6.97
451.125	487.79	7.48
455.625	495.41	8.01

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 17 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
460.125	503.53	8.58
464.625	511.73	9.18
469.125	520.49	9.83
473.625	529.36	10.50
478.125	538.64	11.21
482.625	548.58	11.98
487.125	558.77	12.79
491.625	569.49	13.64
496.125	580.80	14.55
500.625	592.77	15.51
505.125	605.49	16.54
509.625	619.04	17.64
514.125	633.30	18.79
518.625	648.86	20.04
523.125	665.44	21.36
527.625	683.43	22.77
532.125	703.08	24.29
536.625	724.66	25.92
541.125	748.32	27.66
545.625	774.72	29.55
550.125	804.44	31.59
554.625	838.02	33.79
559.125	876.67	36.20
563.625	921.53	38.81
568.125	974.67	41.69
572.625	1038.92	44.86
577.125	1118.28	48.37
581.625	1219.82	52.30
586.125	1339.55	56.26
590.625	1522.54	61.22
595.125	1798.21	66.92

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 17 PAGE # 3

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
599.625	2265.96	73.55
604.125	3245.33	81.39

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 18 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
364.500	367.66	0.84
369.000	372.57	0.94
373.500	377.53	1.04
378.000	382.55	1.15
382.500	387.40	1.26
387.000	392.47	1.38
391.500	397.60	1.52
396.000	402.79	1.67
400.500	408.06	1.82
405.000	413.41	1.99
409.500	418.60	2.16
414.000	424.06	2.36
418.500	429.60	2.56
423.000	435.25	2.78
427.500	441.01	3.02
432.000	446.62	3.26
436.500	452.54	3.52
441.000	458.61	3.81
445.500	464.82	4.11
450.000	470.88	4.42
454.500	477.33	4.75
459.000	483.96	5.12
463.500	490.50	5.48
468.000	497.44	5.89
472.500	504.39	6.30
477.000	511.71	6.76
481.500	519.30	7.24
486.000	526.88	7.73
490.500	534.96	8.27
495.000	543.09	8.83

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 18 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
499.500	551.77	9.43
504.000	560.54	10.06
508.500	569.71	10.72
513.000	579.50	11.44
517.500	589.50	12.18
522.000	600.01	12.97
526.500	611.06	13.81
531.000	622.73	14.70
535.500	635.06	15.65
540.000	648.16	16.66
544.500	662.11	17.73
549.000	676.81	18.86
553.500	692.81	20.08
558.000	709.86	21.37
562.500	728.36	22.75
567.000	748.53	24.23
571.500	770.66	25.82
576.000	794.90	27.51
580.500	821.90	29.35
585.000	852.25	31.33
589.500	886.45	33.48
594.000	925.73	35.81
598.500	971.18	38.35
603.000	1024.83	41.14
607.500	1089.19	44.20
612.000	1168.50	47.61
616.500	1268.94	51.40
621.000	1386.21	55.22
625.500	1563.03	60.00
630.000	1823.78	65.47
634.500	2250.98	71.82

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 19 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
406.125	411.00	1.14
410.625	415.83	1.24
415.125	420.90	1.36
419.625	426.04	1.49
424.125	431.24	1.63
428.625	436.52	1.78
433.125	441.88	1.94
437.625	447.05	2.10
442.125	452.50	2.28
446.625	458.03	2.47
451.125	463.67	2.67
455.625	469.42	2.89
460.125	474.99	3.12
464.625	480.89	3.36
469.125	486.92	3.62
473.625	493.09	3.90
478.125	499.11	4.19
482.625	505.49	4.50
487.125	512.05	4.83
491.625	518.52	5.17
496.125	525.37	5.54
500.625	532.43	5.93
505.125	539.42	6.34
509.625	546.85	6.78
514.125	554.29	7.23
518.625	562.18	7.72
523.125	570.13	8.22
527.625	578.56	8.77
532.125	587.09	9.34
536.625	596.18	9.96

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 19 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
541.125	605.39	10.59
545.625	615.03	11.26
550.125	625.32	11.99
554.625	635.86	12.75
559.125	646.94	13.55
563.625	658.61	14.39
568.125	670.94	15.30
572.625	684.00	16.25
577.125	697.89	17.27
581.625	712.47	18.34
586.125	728.33	19.50
590.625	745.16	20.71
595.125	763.36	22.02
599.625	783.14	23.41
604.125	804.76	24.91
608.625	828.53	26.51
613.125	854.63	28.23
617.625	883.56	30.08
622.125	916.41	32.09
626.625	953.57	34.26
631.125	996.15	36.62
635.625	1045.90	39.21
640.125	1104.64	42.03
644.625	1175.90	45.16
649.125	1264.17	48.63
653.625	1368.00	52.23
658.125	1510.31	56.44
662.625	1714.04	61.35
667.125	2021.37	67.01
671.625	2543.57	73.60
676.125	3637.17	81.42

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 20 PAGE # 1

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
450.000	457.05	1.52
454.500	462.29	1.66
459.000	467.61	1.80
463.500	472.75	1.95
468.000	478.15	2.11
472.500	483.64	2.28
477.000	489.21	2.47
481.500	494.89	2.67
486.000	500.41	2.87
490.500	506.23	3.09
495.000	512.16	3.33
499.500	518.22	3.58
504.000	524.15	3.83
508.500	530.41	4.11
513.000	536.82	4.41
517.500	543.17	4.71
522.000	549.84	5.04
526.500	556.69	5.39
531.000	563.51	5.76
535.500	570.70	6.15
540.000	578.12	6.56
544.500	585.51	6.99
549.000	593.36	7.45
553.500	601.25	7.92
558.000	609.61	8.44
562.500	618.05	8.97
567.000	627.02	9.54
571.500	636.12	10.13
576.000	645.60	10.76
580.500	655.70	11.44

ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
COMMUNICATION & CONTROL DIVISION

NUMBER OF TRUNKS 20 PAGE # 2

CARRIED TRAFFIC CCS	OFFERED TRAFFIC CCS	EXPECTED VALUE XP PERCENT
585.000	666.03	12.14
589.500	676.86	12.88
594.000	688.24	13.67
598.500	700.22	14.50
603.000	712.87	15.39
607.500	726.27	16.33
612.000	740.51	17.33
616.500	755.48	18.37
621.000	771.72	19.51
625.500	788.96	20.70
630.000	807.59	21.97
634.500	827.82	23.33
639.000	849.90	24.79
643.500	874.16	26.36
648.000	900.76	28.04
652.500	930.19	29.83
657.000	963.56	31.79
661.500	1000.99	33.89
666.000	1044.26	36.20
670.500	1094.15	38.70
675.000	1153.34	41.46
679.500	1224.38	44.48
684.000	1311.98	47.85
688.500	1422.86	51.60
693.000	1552.86	55.39
697.500	1748.55	60.12
702.000	2037.64	65.56
706.500	2511.74	71.88